Remarks

Applicants appreciate the Examiner's indication that claims 5, 6, 11, 14, 15, 26, 27, 30, and 31 are directed to allowable subject matter.

Additionally, in the Office Action of June 28, 2005, the Examiner objected to the disclosure based on an informality, objected to claims 1 and 18, and rejected claims 1-4, 7-10, 12, 13, 16-25, 28, and 29 under 35 U.S.C. § 102(e) or 35 U.S.C. § 103(a). Specifically, claims 1, 7, 8, 12, 13, 18-20, 28, and 29 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,831,923 to Laor et al. ("Laor"); claims 9 and 21 stand rejected under 35 U.S.C. § 103(a) in view of Laor; claims 2, 3, 16, 17, 23, and 24 stand rejected under 35 U.S.C. § 103(a) in view of Laor and portions of the Background section of Applicants' disclosure; claims 4 and 25 stand rejected under 35 U.S.C. § 103(a) in view of Laor and further in view of U.S. Patent Publication No. 2002/0085578 to Dell et al. ("Dell") and U.S. Patent No. 4,907,147 to Saito ("Saito"); and claims 10 and 22 stand rejected under 35 U.S.C. § 103(a) in view of Laor and further in view of U.S. Patent Publication No. 2002/0163935 to Paatela ("Paatela").

By this Amendment, Applicants have amended the specification to correct an informality and amended claims 1 and 18 to improve form. Additionally, Applicants propose amending Fig. 3 to conform to the amendments to the specification. Claims 1-31 are currently pending.

In view of the amendments to the specification, Applicants submit that the objection to the specification is obviated.

Claims 1 and 18 were objected to by the Examiner because, according to the Examiner: "The meaning of 'pipeline stages that together simultaneously operate' is not clear since the pipeline stages sequentially includes 10 stages . . . and each stage can be applied on the data items sequentially." In amended claims 1 and 18, the term "together" has been deleted. Applicants submit that the amended phrase "pipeline stages that simultaneously operate" is clear and definite. As described by the specification and as one of ordinary skill in the art would recognize, each stage of a pipeline may operate at the same time (simultaneously).

Rejection of Claims 1, 7, 8, 12, 13, 18-20, 28, and 29
Under 35 U.S.C. § 102(e) Based on Laor

Independent claim 1, as amended, is directed to a reorder engine for reordering, on a per-entity basis, out-of-order data items received from a plurality of entities. The reorder engine includes a pipeline including a plurality of pipeline stages that simultaneously operate on the data items to reorder the data items to correspond to a transmitting order of the data items from each of the entities. The reorder engine further includes per-entity context memories operatively coupled to the pipeline stages. The per-entity context memories store information relating to a state of reordering for each of the entities, the pipeline stages reading from and updating the context memories based on the entity of the data item being processed.

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Laor discloses a pipelined packet switch that processes packets independently and asynchronously. (Laor, Abstract). As shown in Figs. 2A and 2B of Laor, and as described in the corresponding description of these figures, the pipelined packet switch of Laor includes a number of stages, such as fetch stage 210 and switching stage 220. During processing in these stages, received packets may become out-of-order relative to the order in which they were received by the switch. (See Laor, Abstract; column 4, lines 41-44; and column 5, lines 14-16). Laor further discloses reorder and rewrite engine 222, which reorders the packets that have become out-of-order within the switch to their original incoming packet order. (Laor, column 5, lines 14-16).

In contrast to Laor, claim 1 is directed to a reorder engine for reordering, on a per-entity basis, out-of-order data items received from a plurality of entities. More specifically, claim 1 recites, for example, a pipeline including a plurality of pipeline stages that simultaneously operate on the data items to reorder the data items to correspond to a transmitting order of the data items from each of the entities. Laor does not reorder packets based on a transmitting order of the packets, rather, Laor clearly discloses that reorder and rewrite engine 222 reorders incoming packets to the original order in which the incoming packets were received by switch 100.

Claim 1 additionally recites per-entity context memories operatively coupled to the pipeline stages, the per-entity context memories storing information relating to a state of reordering for each of the entities, the pipeline stages reading from and updating the context memories based on the entity of

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the data item being processed. Applicants submit that Laor also does not

disclose or suggest the per-entity context memories recited in claim 1. The

entities of claim 1 are the entities that transmit the data items that are received by

the reorder engine. As previously mentioned, the reordering disclosed by Laor is

not on a per-entity basis, but rather, is based on the order in which packets are

recited by the switch 100 of Laor. Accordingly, Laor could not possibly disclose

or suggest "per-entity context memories storing information relating to a state of

reordering for each of the entities, the pipeline stages reading from and updating

the context memories based on the entity of the data item being processed," as

is recited in claim 1.

In rejecting claim 1, the Examiner points to reorder/rewrite memories 223

of Laor as allegedly corresponding to the per-entity context memories. (Office

Action, page 3). Reorder/rewrite memories 223 of Laor are described as

memories that receive packet header data from switch engines 221. (Laor,

column 5, lines 10-14). Memories 223 of Laor, however, cannot reasonably be

said be to context memories storing information relating to a state of reordering,

as recited in claim 1, much less per-entity context memories that are read from

and updated based on the entity of the data item being processed, as is further

recited in claim 1.

For at least these reasons, Applicants submit that Laor does not disclose

or suggest each of the features recited in claim 1, and accordingly, the rejection

of claim 1 based on Laor is improper and should be withdrawn. The rejection of

claims 7 and 8 based on Laor are also improper and should be withdrawn, at least by virtue of their dependency from claim 1.

Independent claim 12 and its dependent claims 13 also stand rejected under 35 U.S.C. § 102(e) based on Laor. Applicants respectfully traverse this rejection.

Claim 12 is directed to a method of reordering data items. The method includes receiving the data items associated with a plurality of entities and inputting the received data items into a pipelined reorder engine. The method further includes sequentially forwarding each of the input data items through stages of the pipelined reorder engine that reorders the received data items on a per-entity basis to correspond to a transmitting order of the data items.

Laor does not disclose or suggest each of the features of claim 12. As discussed above, Laor discloses a pipelined packet switch. The "reorder" portion of the pipelined packet switch of Laor, however, appears to be the single stage reorder and rewrite engine 222. Accordingly, Laor does not disclose, as is recited in claim 1, inputting received data items into a pipelined reorder engine. The reorder and rewrite engine 222 of Laor appears to be a single stage of a pipeline, but is not of itself a pipeline.

Claim 12 further recites "sequentially forwarding each of the input data items through stages of the pipelined reorder engine that reorders the received data items on a per-entity basis to correspond to a transmitting order of the data items." As mentioned with regard to the discussion of claim 1, Laor does not reorder received data items on a per-entity basis to correspond to a transmitting

order of the data items. Reordering packets to correspond to the order in which

the packets were received by a switch, as disclosed by Laor, in no way discloses

or suggests reordering received data items on a per-entity basis to correspond to

a transmitting order of the data items, as recited in claim 1.

For at least these reasons, Applicants submit that Laor does not disclose

or suggest each of the features recited in claim 12, and accordingly, the rejection

of claim 12 based on Laor is improper and should be withdrawn. The rejection of

claim 13 based on Laor is also improper and should be withdrawn, at least by

virtue of the dependency of this claim from claim 12.

Independent claim 18 and its dependent claims 19 and 20 also stand

rejected under 35 U.S.C. § 102(e) based on Laor. Applicants respectfully

traverse this rejection.

Claim 18, as amended, is directed to a network device comprising a data

transmission component and a plurality of processing elements connected by the

data transmission component. Thee processing elements communicate with one

another by transmitting data items over the data transmission component. The

processing elements each include a reorder engine configured to arrange data

items received from a transmitting processing element into an order

corresponding to an order in which the data items were transmitted from the

transmitting processing element. Each of the reorder engines includes a pipeline

having a plurality of pipeline stages that simultaneously operates on the received

data items to arrange the data items into the order corresponding to the order in

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which the data items were transmitted from respective transmitting processing elements.

Laor does not disclose or suggest each of the features recited in claim 18. As discussed above with regard to claim 1, Laor discloses a pipelined packet switch. The "reorder" portion of the pipelined packet switch of Laor, however, appears to be the single stage reorder and rewrite engine 222. Accordingly, Laor does not disclose, as is recited in claim 18, reorder engines each including a pipeline having a plurality of pipeline stages that simultaneously operate on the received data items. The reorder and rewrite engine 222 of Laor appears to be a single stage of a pipeline, but is not of itself a pipeline.

Further, the reorder engines recited in claim 18 operate on the received data items to arrange the data items into the order corresponding to the order in which the data items were transmitted from respective transmitting processing elements. In contrast, Laor discloses reordering packets to correspond to the order in which the packets were received by a switch.

For at least these reasons, Applicants submit that Laor does not disclose or suggest each of the features recited in claim 18, and accordingly, the rejection of claim 18 based on Laor is improper and should be withdrawn. The rejection of claims 19 and 20 based on Laor are also improper and should be withdrawn, at least by virtue of their dependency from claim 18.

Claims 19 and 20 recite additional features not disclosed or suggested by Laor. Claim 19, for example, recites that each of the reorder engines further includes per-entity context memories operatively coupled to the pipeline stages.

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Based on rationale similar that given above with regard to claim 1, Applicants submit that Laor also fails to disclose or suggest the per-entity context memories recited in claim 19.

Independent claim 28 and its dependent claim 29 also stand rejected under 35 U.S.C. § 102(e) based on Laor. Based on reasons similar to those given for claim 12, Applicants submit that Laor does not disclose each feature of claim 28 and the rejection of claim 28 is therefore improper and should be withdrawn. The rejection of claim 29 should be withdrawn at least by virtue of the dependency of this claim from claim 28.

*Rejection of Claims 9 and 21
Under 35 U.S.C. § 103(a) Based on Laor*

Without acquiescing in the rejections of these claims based on Laor, Applicants submit that the rejections of these claims should be withdrawn, at least because, for the reasons given above, Laor does not disclose or suggest the features recited in the claims from which these claims depend.

*Rejection of Claims 2, 3, 16, 17, 23, and 24
Under 35 U.S.C. § 103(a) Based on
Laor and Applicants' Specification*

In rejecting claims 2, 3, 16, 17, 23, and 24, the Examiner additionally relies on Applicants' disclosure to disclose a switch fabric and a router. As an initial

matter, Applicants note that the Background of the Invention section of the instant application is not admitted prior art, but is merely background information.

Applicants submit that the rejection of claims 2, 3, 16, 17, 23, and 24 are improper at least by virtue of their dependency from an independent claim. As discussed above, Laor does not disclose or suggest each of the features of independent claims 1, 12, or 18. These claims recite additional features that are not disclosed or suggested by Laor.

Claim 2, for example, further defines the features of claim 1 and recites that the entities are connected to the reorder engine via a switch fabric. The Examiner contends that it would have been obvious to implement a switch fabric in the system of Laor "to carry the packets between the ports." (Office Action, page 5). Applicants respectfully disagree with the Examiner's rationale for modifying Laos. As shown in Fig. 1 of Laos, the packet switch 100 of Laos appears to be directly connected to a packet memory 110, which is connected to network interfaces 101. Applicants submit that one of ordinary skill in the art would not be motivated to modify Laos to include a switch fabric "to carry the packets between the ports" because Laos explicitly discloses structure for transporting packets. Claim 16 recites features similar to those recited in claim 2. Accordingly, Applicants submit that the Examiner has not presented a *prima facie* case of obviousness with regard to claims 2 and 16.

Rejection of Claims 4 and 25
Under 35 U.S.C. § 103(a) Based on Laor, Dell, and Saito

Claim 4 further defines the features of claim 1 and recites that the pipeline stages include at least one arbitration stage that determines an active entity to process and an address computation stage that calculates a position of a data item associated with a particular one of the entities relative to other data items associated with the particular entity based on a sequence number of the data item. The Examiner relies on Dell to disclose the arbitration stage recited in claim 4 and on Saito to disclose the address computation stage recited in claim 4 (Office Action, page 6).

The Examiner's stated motivation for combining Laor and Dell is "for the purpose of including at least one arbitration stage in the pipeline stages because one would be motivated to check an active entity for the purpose of processing." Applicants submit that this statement is a conclusory motivation statement that does not find support in either Laor or Dell. Moreover, Applicants submit that it is not clear how modifying Laor to include an "arbitration stage" would improve the system of Laor. For at least these reasons, Applicants submit that the Examiner has not made a *prima facie* case of obviousness for combining Laor and Dell, and the rejection of claim 4 should therefore be withdrawn.

The Examiner further relies on element 32 (Fig. 4) of Saito to disclose the address computation stage recited in claim 4. Applicants submit that although Saito discloses an "address computation stage," the address computation stage of Saito is not configured to calculate a position of a data item associated with a particular one of the entities relative to other data items associated with the particular entity based on a sequence number of the data item, as is recited in

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claim 4. Accordingly, even if Saito were combined with Laor as the Examiner suggests, the combination of Saito and Laor would still not disclose or suggest the address computation stage recited in claim 4.

For at least the foregoing reasons, Applicants submit that the rejection of claim 4 is improper and should be withdrawn. Claim 25 recites certain features similar to those recited in claim 4 and the rejection of this claim should also be withdrawn.

Rejection of Claims 10 and 22
Under 35 U.S.C. § 103(a) Based on Laor and Paatela

Regarding the rejections of claims 10 and 22 based on Laor and Paatela, Applicants have reviewed Paatela and submit that Paatela does not cure the above-noted deficiencies of Laor with regard to the claims from which claims 10 and 22 depend. Accordingly, at least by virtue of their dependency, the rejections of claims 10 and 22 should be withdrawn.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request the Examiner's reconsideration of this application, and the timely allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 CFR 1.136 is hereby made. Please charge any shortage in fees due in connection

with the filing of this paper, including extension of time fees, to Deposit Account

No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Attachment: Replacement Sheet for Fig. 3

Amendments to the Drawings:

Subject to the approval of the Examiner, please replace the drawing sheet labeled Fig. 3 with the attached Replacement Drawing Sheet Fig. 3.